

REMARKS

The Examiner's Action mailed on March 23, 2005, has been received and its contents carefully considered.

In this Amendment, Applicants have editorially amended the specification, amended claims 1, 2, 5, 6, 7, 10 and 12, and canceled claim 4. Claims 1, 10 and 12 are the independent claims, and claims 1-3 and 5-13 remain pending in the application. For at least the following reasons, it is submitted that this application is in condition for allowance.

The Examiner has rejected claim 4 as being indefinite, and has objected to the specification for not providing antecedent basis for the subject matter recited in claim 4. Because claim 4 has been canceled, this rejection and objection have been rendered moot.

The Examiner has objected to the specification for various informalities. These and other informalities have been corrected. It is requested that this objection be withdrawn.

The Examiner's Action has rejected claims 1-9 as being obvious over *Sachiko et al.* (JP-11-168052) in view of *Takamitsu* (JP-2001-274062). It is submitted that these claims are *prima facie* patentably distinguishable over the cited references for at least the following reasons.

Applicants' independent claim 1 is directed to a process for forming a pattern which includes forming a resist film on top of a workpiece film. The resist film is irradiated with a first energy beam, and subsequently formed into a first resist pattern. The first resist pattern is then irradiated with a second energy beam to thereby effect a crosslinking reaction in the first resist pattern, and so that the

first resist pattern is caused to have a second glass transition temperature that is higher than a first glass transition temperature of the original resist film.

Thereafter, heat treatment is performed at a temperature that is higher than the first glass transition temperature, to form a smaller second resist pattern.

As disclosed by Applicants' specification, prior to Applicants' claimed invention, it had not previously been possible to perform heat treatment at high temperatures above the glass transition temperature of the resist film, due to deterioration in pattern shape due to thermal damage and the like, as disclosed in Applicants' specification on page 8, lines 8 through 14. Applicants' claimed invention overcomes this problem by subjecting the resist pattern to a second energy beam to effect a crosslinking reaction in the first resist pattern, so as to increase its glass transition temperature, and so that the baking process of the heat treatment can be performed at a higher temperature. This claimed invention is neither disclosed nor suggested by the cited references.

Sachiko et al. is directed to a method of making a semiconductor device, in which an energy beam is applied simultaneous with the application of a heat treatment. However, and in contrast to the present invention, there is no apparent disclosure or suggestion from this reference of the glass transition temperature of a first resist pattern, much less effecting a crosslinking reaction in the first resist pattern by irradiating the first resist pattern with a second energy beam so that the first resist pattern is caused to have a second glass transition temperature that is higher than the first glass transition temperature, as recited by Applicants' independent claim 1.

Moreover, there is no apparent disclosure or suggestion from this reference that the heat treatment performed by this reference is at a temperature that is higher than the first glass transition temperature. In fact, it is most likely that the heat treatment being performed is lower than the glass transition temperature of the original resist pattern, in order to prevent deterioration in the pattern shape due to thermal damage.

To overcome the deficiencies of *Sachiko et al.*, the Examiner's Action relies on the teachings of *Takamitsu*. *Takamitsu* is directed to a method of forming a resist pattern which includes subjecting the resist pattern to a high temperature baking treatment for 60 seconds at a 135° C. However, it is initially noted that this baking temperature, although referred to as being a high temperature baking temperature, is in fact being performed at a temperature that is lower than Applicants' disclosed first glass transition temperature, which Applicants' specification recites as being about a 150° C. Thus, this reference does not disclose or suggest a heat treatment that is being performed at a higher temperature than a first glass transition temperature, as recited by Applicants' independent claim 1.

Moreover, there is no disclosure or suggestion from this reference of effecting a crosslinking reaction in a first resist pattern so that the first resist pattern is caused to have a second glass transition temperature that is higher than the first glass transition temperature, by irradiating the first resist pattern with a second energy beam, as recited by Applicants' independent claim 1. As such, it is submitted that Applicants' independent claim 1, and the claims dependent therefrom, are *prima facie* patentably distinguishable over the cited references. It

is thus requested that these claims be allowed and that these rejections be withdrawn.

The Examiner's Action has also rejected claims 9-13 as being obvious over *Sachiko et al.* in view of *Takamitsu*, and further in view of *Koji* (JP-2002-164302). It is submitted that these claims are *prima facie* patentably distinguishable over the cited combination of references for at least the following reasons.

Koji teaches patterning a workpiece film as a mask and doping to form a MOSFET, wherein the patterned workpiece film is a gate electrode of the MOSFET. This reference also teaches patterning the workpiece film using a resist pattern as a mask, with the patterned workpiece film being used as a wiring to electrically connect to the semiconductor device. However, this reference does not overcome the above-noted deficiencies of *Sachiko et al.* and *Takamitsu*, so therefore, Applicants' dependent claim 9 is submitted to be *prima facie* patentably distinguishable over the cited combination of references for at least the same reasons as independent claim 1, from which this claim depends.

Moreover, Applicants' independent claims 10 and 12 are submitted to be *prima facie* patentably distinguishable over the cited combination of references for reasons similar to those presented above with respect to claim 1, as well as for at least the following additional reason.

Applicants' claimed workpiece film is made by use of a second resist pattern which is made by heating the resist pattern after application of a second energy beam. This allows the workpiece film to be better adapted for use as a gate electrode of a MOSFET or a wiring. However, the workpiece film disclosed by *Koji* is not a workpiece film which is made by heating a resist pattern after

application of a second energy beam. As such, it is submitted that Applicants' independent claims 10 and 12, and the claims dependent therefrom, are *prima facie* patentably distinguishable over the cited combination of references. It is thus requested that these claims be allowed and that these rejections be withdrawn.

It is submitted that this application is in condition for allowance. Such action and the passing of this case to issue are requested.

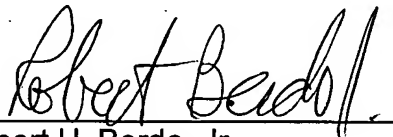
Should the Examiner feel that a conference would help to expedite the prosecution of this application, the Examiner is hereby invited to contact the undersigned counsel to arrange for such an interview.

Should any fee be required, the Commissioner is hereby authorized to charge the fee to our Deposit Account No. 18-0002, and advise us accordingly.

Respectfully submitted,

June 16, 2005

Date



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